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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/924,128	08/07/2001	John R. Barry	062004-1740	3054
24504	7590	01/12/2005	EXAMINER	
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP 100 GALLERIA PARKWAY, NW STE 1750 ATLANTA, GA 30339-5948			WANG, TED M	
			ART UNIT	PAPER NUMBER
			2634	

DATE MAILED: 01/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/924,128	Applicant(s) <b>AK</b> BARRY ET AL.	
	Examiner Ted M Wang	Art Unit 2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 8/7/2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17-19, 22-28, and 31 is/are rejected.
- 7) ☒ Claim(s) 16, 20, 21, 29, and 30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 8/7/2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/7/2001</u> | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to because

- Mark reference number "729" to a specific location (output of MOD, 727) in Fig.7.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4)

because reference character "500" has been used to designate both TDD array-to-array system and communication device in Fig.6 (page 12 lines 1-4). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they do not include the following reference sign(s) mentioned in the description: reference number 730 (pages 20-21). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid

abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawing should label all the elements in the figures. For example, in Fig.5 530 should be labeled as unitary precoder filter; and 531 should be labeled as transmitter;...etc.

#### ***Specification***

5. The disclosure is objected to because of the following informalities:
- On page 13 line 2, insert – (Fig.7) – after "logic".
  - Reference character "718" has been used to designate both connection and microprocessor (pages 17-21).
  - Reference character "728" has been used to designate both connection and microprocessor (pages 17-21).

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 2 and 3 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- With regard claims 2 and 3, the limitation of “when the receiver becomes a transmitter” as recited has not been taught in the specification. It is not clear that how a receiver becomes a transmitter. The specification teaches only “in a preferred embodiment, there exists a single unitary filter for each communications device (e.g. 500 or 590, transceiver) that effectively performs two roles, one as a unitary precoder filter and another as a unitary front-end filter.” as recited on page 12 lines 12-14.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1, 4-15, 17-19, 22-28, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sung et al. (Space-time processing with channel knowledge in Array-to-Array Communications, June 9, 2000, see IDS filed on 12/7/2001) in view of Papadias (US 6,654,719).

- With regard claim 1, Sung et al., cited by the applicant, discloses an adaptive communications system comprising:
  - a unitary matrix filter (page 2 lines 12-19 and page 5 lines 1-5, and page 5 lines 7-21); and
  - a system to adapt the unitary matrix filter to diagonalize a transmission channel (Fig.2, page 2 lines 12-19, and page 5 lines 7-21).

Sung et al. discloses all of the subject matter as described above except for specifically teaching a processor to adapt the unitary matrix filter.

However, Papadias teaches a processor to adapt the unitary matrix filter (Fig.1 elements 60 and 80 and column 2 lines 26-45).

It is desirable to include a processor to adapt the unitary matrix filter in order to reduce the system size and cost (column 5 lines 55-67). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by Papadias in which, include a processor to adapt the unitary matrix filter, into Sung's' array-to-array communication system so as to reduce the system size and cost.

- With regard claim 4, Sung et al. further discloses that diagonalize the channel matrix by singular value decomposition (page 1 section 1 Summary lines 1-10 and page 2 lines 12-19).
- With regard claim 5, Sung et al. further discloses the limitation of the unitary matrix filter filters symbol vectors corresponding to a communication signal (page 1 section 1 Summary lines 1-10, and section 2 System model lines 1-14).
- With regard claim 6, Sung et al. further discloses the limitation of the symbol vectors include discrete modulated signals (Fig.1 (a) and (b) and page 1 section 2 System model lines 1-14).
- With regard claim 7, Sung et al. further discloses that the discrete modulated signals are transmitted and received in an array-to-array communications system (page 1 section 1 Summary lines 1-10 and page 2 lines 4-11).
- With regard claim 8, Sung et al. further discloses that the discrete modulated signals are transmitted and received in an array-to-array time division duplex communications system (page 1 section 1 Summary lines 1-10, Fig.5, and page 5 lines 7-21).
- With regard claim 9, Sung et al. further discloses that the processor and the logic and the unitary matrix filter are embodied in a receiver (Fig.5 and page 5 lines 7-21). All other limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 10, Sung et al. further discloses that the processor and the logic and the unitary matrix filter are embodied in a transmitter (Fig.5 and page 5

lines 7-21). All other limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.

- With regard claim 11, Sung et al. further discloses that the processor and the logic and the unitary matrix filter are embodied in a transceiver (Fig.5 and page 5 lines 7-21). All other limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 12, Sung et al. discloses an array-to-array time division duplex communications system that inherently include modem operation, where both base station and mobile station (cellular phone) transmit over the same channel, but at different times. Thus, both base station and mobile station (cellular phone) should be implemented with the transceiver as described in claim 11.
- With regard claims 13 and 14, all limitation is contained in claim 12. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 15, Sung et al. further discloses the limitation that the unitary matrix filter is defined by a singular value decomposition of a channel matrix (page 1 section 1 Summary lines 1-10 and page 2 lines 12-19).
- With regard claim 17, Sung et al. further discloses the limitation that adapt the unitary matrix filter without requiring feedback to a transmitter from a receiver (page 5 lines 7-21).
- With regard claim 18, Sung et al. further discloses the limitation that adapt an estimate of a unitary factor of a singular value decomposition of a channel matrix (Summary lines 1-10 and page 3 lines 1-9).



- With regard claim 19, which is a method claim related to claim 1, all limitation is contained in claim 1. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 22, which is a method claim related to claim 4, all limitation is contained in claim 4. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 23, which is a method claim related to claim 5, all limitation is contained in claim 5. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 24, which is a method claim related to claim 6, all limitation is contained in claim 6. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 25, which is a method claim related to claim 7, all limitation is contained in claim 7. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 26, which is a method claim related to claim 8, all limitation is contained in claim 8. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 27, which is a method claim related to claim 17, all limitation is contained in claim 17. The explanation of all the limitation is already addressed in the above paragraph.

- With regard claim 28, which is a method claim related to claim 15, all limitation is contained in claim 15. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 31, which is a method claim related to claim 18, all limitation is contained in claim 18. The explanation of all the limitation is already addressed in the above paragraph.

***Allowable Subject Matter***

10. Claims 16, 20, 21, 29, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

11. Reference(s) US 6,509,836 and US 5,835,630 are cited because they are put pertinent to the array-to-array communication with unitary matrix. However, none of references teach detailed connection as recited in claim.

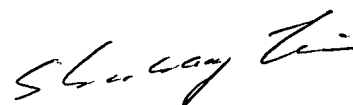
12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M Wang whose telephone number is (571) 272-3053. The examiner can normally be reached on 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Ted M Wang  
Examiner  
Art Unit 2634

Ted M. Wang



**SHUWANG LIU**  
**PRIMARY EXAMINER**